REMARKS

The Office Action mailed on September 11, 2002, has been received and reviewed.

Claims 1-102 were previously pending in the above-referenced application. Claims 68-102, which were restricted out of the above-referenced application and have been withdrawn from consideration, have been canceled without prejudice or disclaimer. Claims 14-16, 27-30, 34-36, 41, and 45-67 have also been withdrawn from consideration for the time being as being drawn to a nonelected species of invention.

Claims 1-13, 17-26, 31-33, 37-40, and 42-44 stand rejected.

Reconsideration of the above-referenced application is respectfully requested.

Objection to the Title

The title has been objected to as being not descriptive of the subject matter recited in the claims that are currently under consideration in the above-referenced application. The title has been amended to more accurately reflect the subject matter recited in the claims.

Rejections Under 35 U.S.C. § 102(e)

Claims 1-13, 17-26, 31-33, 37-40, and 42-44 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 6,424,033 to Akram (hereinafter "Akram").

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Akram describes semiconductor device packages with improved head dissipation abilities. In particular, the semiconductor device packages that are described in Akram include one or more semiconductor devices that have thermal grease covering at least portions of the active surfaces thereof. Col. 1, lines 60 and 61. The thermal grease may also substantially coat

wire bonds, solder balls, and other discrete conductive elements that are electrically connected to bond pads on each thermal grease-coated active surface. Col. 2, lines 3-7. The thermal grease is contained by protective material, such as a packaging material, one or more of the semiconductor devices of the assembly, a circuit board of the assembly, or any combination of the foregoing. Col. 1, lines 61 and 62; FIGs. 1-12.

Several of the assemblies described in Akram, such as those depicted in and described with reference to FIGs. 2, 3, 10, 11, and 12, include multiple semiconductor devices that are stacked relative to one another. These semiconductor devices are spaced apart from one another by way of arrays 920 of solder balls, which act "as the electrical connector between [a] flip chip 40 and [a] die 912." Col. 7, lines 43 and 44. It is, therefore, evident that each array 920 is formed from an electrically conductive material.

Independent claim 1, as amended and presented herein, recites a semiconductor device for use in a stacked multi-chip assembly that includes a semiconductor die and a spacer layer comprising dielectric material. The spacer layer protrudes substantially a predetermined distance from a surface of the semiconductor die so as to space an adjacent semiconductor die therefrom. The spacer layer also includes voids that communicate with a lateral periphery thereof.

As Akram does not expressly or inherently describe that the arrays (920) of solder balls described therein may comprise dielectric material, it is respectfully submitted that Akram does not anticipate each and every element of amended independent claim 1. Accordingly, it is respectfully submitted that, under 35 U.S.C. § 102(e), amended independent claim 1 is allowable over Akram.

Claims 2-13, 17, and 18 are each allowable, among other reasons, as depending either directly or indirectly from claim 1, which is allowable.

Claim 9 is further allowable because Akram lacks any express or inherent description that the solder balls of array 920 may be arranged in a random fashion.

Claim 11 is additionally allowable since Akram neither expressly nor inherently describes that the solder balls of array 920 may comprise a polymer.

Claim 12, which depends from claim 11, is also allowable because Akram does not expressly or inherently describe that the solder balls of array 920 may be formed from a photoimageable polymer.

Claim 13 is additionally allowable since Akram neither expressly nor inherently describes that the solder balls of array 920 may be formed from a glass, a silicon dioxide, a silicon nitride, or a silicon oxynitride.

Claim 17 is further allowable because Akram lacks any express or inherent description that an adhesive material may be located on an exposed surface of any of the solder balls of array 920.

Claim 18 is also allowable because Akram does not expressly or inherently describe that any of the solder balls of array 920 may comprise a plurality of at least partially superimposed, contiguous, mutually adhered sublayers.

Independent claim 19, as amended and presented herein, is drawn to a semiconductor device assembly that includes a first semiconductor device, a nonconfluent spacer layer, and a second semiconductor device. The nonconfluent spacer layer, which comprises dielectric material, is positioned over a surface of the first semiconductor device. The second semiconductor device is positioned over the first semiconductor device and adhered to nonconfluent spacer layer.

Again, Akram lacks any express or inherent description of a semiconductor device assembly that includes a nonconfluent spacer layer that comprises dielectric material. Rather, the description of Akram is limited to an array 920 of solder balls, which are inherently formed from conductive, not dielectric, material, to space two semiconductor devices apart from one another.

Therefore, Akram does not anticipate each and every element of amended independent claim 19. It is, therefore, respectfully submitted that, under 35 U.S.C. § 102(e), independent claim 19 is allowable over Akram.

Each of claims 20-26, 31-33, 37-40, and 42-44 is allowable, among other reasons, as depending either directly or indirectly from claim 19, which is allowable.

Claim 31 is also allowable because Akram does not expressly or inherently describe that any of the solder balls of array 920 may comprise a plurality of at least partially superimposed, contiguous, mutually adhered sublayers.

Claim 32 is additionally allowable since Akram neither expressly nor inherently describes that the solder balls of array 920 may be formed from a glass, a silicon dioxide, a silicon nitride, or a silicon oxynitride.

Claim 40 is further allowable because there is no express or inherent description in Akram that the array 920 of solder balls may be positioned between an active surface of a first semiconductor device and a backside of a second semiconductor device.

Claim 42 is also allowable since Akram neither expressly nor inherently describes a plurality of nonconfluent spacer layers between first and second semiconductor devices, the additive thicknesses of the layers defining a distance between the first and second semiconductor devices.

Claim 43 depends from claim 42 and is further allowable because Akram lacks any express or inherent description that a first nonconfluent spacer layer may be adhered to a surface of a first semiconductor device and a second nonconfluent spacer layer may be adhered to an opposed surface of a second semiconductor device.

Claim 44 also depends from claim 42 and is additionally allowable since Akram does not expressly or inherently describe that at least some solid regions of each of a plurality of nonconfluent spacer layers between two semiconductor devices may be at least partially superimposed relative to one another.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 102(e) rejections of claims 1-13, 17-26, 31-33, 37-40, and 42-44 be withdrawn.

CONCLUSION

It is respectfully submitted that each of claims 1-13, 17-26, 31-33, 37-40, and 42-44 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing the allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully Submitted,

Brick G. Power
Registration Number 38,581
Attorney for Applicant
TRASKBRITT, PC
P.O. Box 2550
Salt Lake City, Utah 84110
Telephone: (801) 532-1922

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Enclosure: VERSION WITH MARKINGS TO SHOW CHANGES MADE

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE TITLE:

[SPACER FOR] SEMICONDUCTOR DEVICES[,] AND SEMICONDUCTOR DEVICE[S AND] ASSEMBLIES INCLUDING [THE] A NONCONFLUENT SPACER LAYER[, AND METHODS]

IN THE CLAIMS:

Please amend the claims as follows:

1. (Amended) A semiconductor device for use in a stacked multi-chip assembly, comprising:

a semiconductor die; and

a spacer layer comprising dielectric material, formed on at least a portion of a surface of said semiconductor die, and protruding therefrom substantially a predetermined distance that said semiconductor die and an adjacent semiconductor die of said stacked multi-chip assembly are to be spaced apart from one another, said spacer layer including voids communicating with a lateral periphery thereof.

19. (Amended) A semiconductor device assembly, comprising:

a first semiconductor device;

a nonconfluent spacer layer comprising dielectric material and being positioned on a surface of said first semiconductor device; and

a second semiconductor device positioned over said first semiconductor device, a surface of said second semiconductor device being adhered to said nonconfluent spacer layer.